

REMARKS

This amendment is responsive to the Office Action of April 9, 2007. Entry of these amendments and remarks, and reconsideration and allowance of claims 1-5 and 8-15 as set forth herein, are requested.

The Status of the Claims

Claims 1-15 were examined.

Claims 1-4, 6-8, 10, and 11 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by Oshio et al., U.S. Pat. No. 6,515,476 (hereinafter "Oshio").

Claims 10-13 and 15 stand rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter.

Claim 5 is indicated as containing allowable subject matter.

Claim 9 is indicated as allowed.

Claim 14, for which no basis of rejection is articulated, is understood to contain allowable subject matter.

Comment on Statement of Reasons for Allowance of Claim 9

The Office Action reiterates a statement of reasons for allowance of claim 9. This statement appears to be duplicative of the statement of reasons for allowable subject matter set forth in the immediately previous Office Action. Applicants understand these reasons as stating that the combination of limitations set forth in claim 9 define allowable subject matter.

The Rejections Under § 101 Are Addressed

Claim 10 has been amended to call for iteratively adjusting the phase correction on the basis of the distribution of phase values of the complex image, and displaying or storing an image corresponding to the complex image incorporating the iteratively adjusted phase correction. These amendments are supported in the original specification at least at page 6 lines 7-10.

Claim 11 has been amended to call for a digital image processing unit including a programmed processing unit. This amendment is supported in the original specification at least at page 6 lines 4-17.

It is believed that these amendments obviate the § 101 rejections. However, if the rejections under § 101 are maintained in the forthcoming Office Action, Applicants note the MPEP guidelines in this matter, which state:

If the invention as set forth in the written description is statutory, but the claims define subject matter that is not, the deficiency can be corrected by an appropriate amendment of the claims. In such a case, USPTO personnel should reject the claims drawn to nonstatutory subject matter under 35 U.S.C. § 101, but identify the features of the invention that would render the claimed subject matter statutory if recited in the claim.

MPEP § 2106 Section IV(B) (underscores added).

Applicants respectfully request, if the § 101 rejections are maintained in the next Office Action, that the next Office Action also identify any features of the invention that are believed would render the claimed subject matter statutory if recited in the claims, in accordance with Office procedures as specified in MPEP § 2106.

On the other hand, if the § 101 rejections are withdrawn, then Applicants note that there are no other outstanding rejections of claims 12, 13, and 15. Accordingly, if the § 101 rejections are withdrawn, Applicants respectfully request at least an indication of allowable subject matter in claims 12, 13, and 15.

Claim 10 Distinguishes Patentably Over the References

Claim 10 has been further amended to call for iteratively adjusting the phase correction on the basis of the distribution of phase values of the complex image to generate an iteratively adjusted phase correction that enhances peaks in the distribution of phase values relative to broader structures. The underscored subject matter is added by amendment, and is supported in the original specification at least at page 2 lines 25-26.

It is recognized in the present application that accurate correction of phase errors tends to lead to peaks in the distribution of phase values (such distribution, for example, suitably represented as a histogram) rather than broad structures. Claim 10

has been amended to positively recite iteratively adjusting the phase correction to generate an iteratively adjusted phase correction that enhances peaks in the distribution relative to broader structures.

Applicants' previous Amendment A provided a detailed analysis of the two steps of Oshio's phase correction. Of these, only the second phase correction (Oshio Fig. 5 and col. 9) makes use of a histogram of the distribution of phase values. Specifically, Oshio applies a phase correction to ensure that the fat/water separation in the histogram is precisely $\pi/2$, which has the advantage that the water and fat are then represented by the real and imaginary parts of the complex image. This correction is not iterative, and does not include adjusting the phase correction to generate an iteratively adjusted phase correction that enhances peaks in the distribution of phase values relative to broader structures. Rather, the phase correction of Oshio sets the fat/water separation to $\pi/2$.

Applicants again note that **claim 15** is not under any articulated art-based rejection.

In view of the foregoing, it is respectfully submitted that claims 10 and 15 are in condition for allowance. Applicants therefore earnestly request allowance of claims 10 and 15.

Claim 11 Distinguishes Patentably Over the References

Claim 11 has been amended to call for a processing unit programmed to iteratively adjust the phase correction on the basis of a test function of the distribution of phase values of the complex image that discriminates whether the distribution is predominated by peaks or by broader structures, the iterative adjustment being ended when the test function indicates that the distribution is dominated by peaks indicative that the adjusted phase correction is adequate.

The last clause of claim 11 is added by amendment, and is supported in the original specification at least at page 4 lines 23-25. This amendment addresses the objection in the Office Action at page 6 that the manner in which the test function assesses the effectiveness of the phase correction is not recited in the claim.

Applicants respectfully submit that Oshio does not disclose or fairly suggest iterative adjustment of the phase correction on the basis of a test function of

the distribution of phase values of the complex image that discriminates whether the distribution is predominated by peaks or by broader structures, the iterative adjustment being ended when the test function indicates that the distribution is dominated by peaks indicative that the adjusted phase correction is adequate. Indeed, the Office Action never claims to have identified a test function of the distribution of phase values of the complex image that discriminates whether the distribution is predominated by peaks or by broader structures, although claim 11 is alleged to be anticipated by Oshio. Rather, the Office Action objects that the claim does not recite the manner in which the test function assesses the effectiveness of the phase correction. Amended claim 11 now positively recites this subject matter – the iterative adjustment ends when the test function indicates that the distribution is dominated by peaks indicative that the adjusted phase correction is adequate.

Applicants again note that **claims 12 and 13** are not under any articulated art-based rejection.

In view of the foregoing, it is respectfully submitted that claims 11-13 are in condition for allowance. Applicants therefore earnestly request allowance of claims 11-13.

Claim 14 Has Been Placed into Independent Form, and Should Be Allowed

Claim 14 has been placed into independent form including all limitations of canceled base claim 6. There being no articulated basis of rejection of claim 14, Applicants respectfully request that claim 14 be allowed.

The Anticipation Rejection of Claim 1 is Traversed

Claim 1 calls for a magnetic resonance imaging system comprising a reconstruction unit arranged to reconstruct a complex image of complex valued pixels from magnetic resonance signals, compute a distribution of phase values of the complex image, apply a phase correction to the complex image to form a corrected complex image, and iteratively adjust the phase correction on the basis of the distribution of phase values of the complex image.

In rejecting claim 1, the Office Action cites Oshio col. 7 line 65 through col. 8 line 3 as anticipating the claim limitations relating to iteratively adjusting the phase correction. A precise quotation of the cited section of Oshio follows:

FIG. 6(a) shows a schematic of the phase image, in which a one-dimensional profile of the phase image is illustrated when the tomographic image comprises a fat image and a water image surrounding the fat image. FIG. 6(a) illustrates the case in which the phase difference between the water and fat images is $\pi/2$, i.e., n is set to 4 for the phase difference of $2\pi/n$. While the case of $n=4$ will be described hereinbelow, the description also applies to other values of n .

If the static magnetic field is homogeneous, the one-dimensional profile of the phase image (which will be simply referred to as a phase image) is to have a shape indicated by dot-dash line in FIG. 6(a) because the phase of water image is zero. However, if the static magnetic field has linearly slanting inhomogeneity, for example, the phase image will have a shape indicated by solid line.

Oshio col. 7 line 62-col. 8 line 9.

In arguing for patentability of claim 1, Applicants argued in previous Amendment A that there is no disclosure or fair suggestion in Oshio of iteratively adjusting a phase correction on the basis of a distribution of phase values of a complex image.

In response, the present Office Action states "Applicant argues that Oshio fails to teach or fairly suggest the phase value involved with an iterative adjustment wherein the coefficient is adjustable. The examiner disagrees with applicant's argument since Oshio discloses the equation varying for multiple n values (columns 7-8 lines 65-67 and 1-3 respectively), and therefore, the coefficient n is adjustable." Office Action at pages 5-6. The argued iterative limitation is not addressed.

The cited portion of Oshio discloses a phase shift of $2\pi/n$, and discloses that n can be assigned $n=4$ or other values of n . Based on this, one could reasonably characterize n as an adjustable parameter.

Respectfully, how does any of that anticipate iteratively adjusting the phase correction? A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior reference. MPEP § 2131. Applicants respectfully request that the forthcoming Office Action

either identify where Oshio expressly or inherently discloses iteratively adjusting the phase correction, or withdraw the anticipation rejection of claim 1.

Claim 8 has been amended to parallel allowed claim 9 more closely.

There being no other basis of rejection of claim 1, Applicants respectfully request that if the anticipation rejection of claim 1 be withdrawn, that claims 1-5 and 8 be indicated as allowed.

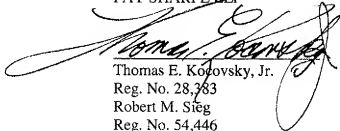
CONCLUSION

For the reasons set forth above, it is submitted that claims 1-5 and 8-15 (all claims) distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone the undersigned at (216) 861-5582.

Respectfully submitted,

FAY SHARPELLP

A large, stylized handwritten signature in black ink, appearing to read 'Thomas E. Kozovsky, Jr.', is written over the printed name and address.

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